

REMARKS

Claims 1-23 are pending in the application upon entry of the amendments and new claims. Claim 9 has been amended for consistency and to better describe certain aspects of the invention. Claims 21-23 have been added to further describe the invention. Favorable reconsideration in light of the amendments, the new claims, and the remarks which follow is respectfully requested.

The Amendments and New Claims

Claim 9 has been amended to correct a typographical error without changing the scope thereof.

New dependent claims 21-23 describe an imaging system where the image transfer medium comprises a first lens positioned toward the object plane and a second lens positioned toward the sensor, the first lens sized to have a focal length smaller than the second lens to provide an apparent reduction of the one or more pixels within the object field plane. In other words, new claims 21-23 are directed to imaging systems with a microscopic field of view (as opposed to an angular field of view).

The Indefiniteness Rejection

Claims 2, 3, 10, 11, 15, 18, and 19 have been rejected under 35 U.S.C. § 112, second paragraph, with respect to scope of the respective independent claims. Applicants respectfully disagree.

MPEP 2173.05(c) states in part: "...Description of examples and preferences is properly set forth in the specification rather than in a single claim. A narrower range or preferred embodiment may also be set forth in another independent claim or in a dependent claim..." (emphasis added). MPEP 2173.05(c) goes on to state "...it is not improper under 35 U.S.C. 112, second paragraph, to present a dependent claim that sets forth a narrower range for an element than the range set forth in the claim from which it depends. For example, if claim 1 reads 'A circuit wherein the resistance is

70-150 ohms' and claim 2 reads 'The circuit of claim 1 wherein the resistance is 70-100 ohms', then claim 2 should not be rejected as indefinite."

Since claims 2, 3, 10, 11, 15, 18, and 19 are dependent claims that all recite range features that are narrower than the range set forth in the claim from which they depend, withdrawal of the rejection is respectfully requested.

The Novelty Rejection

Claims 1-4, 6, and 16-20 have been rejected under 35 U.S.C. § 102(e) over Harris et al. Harris et al relates to identifying pharmaceutical agents using line-scan confocal imaging. A CCD camera is employed to capture images. The Examiner notes column 16, 1st full paragraph in particular, where image capture aspects including resolution of the CCD camera and related system are discussed. In column 16, Harris et al teaches that realizing the resolution limit of the objective lens requires projecting 2.5 pixels onto a diffraction limited spot in the object plane. The Examiner contends that the ratio of projected pixel area to the diffraction limited spot size area is from about 5:1 to about 1:12 and the ratio of projected pixel width to the diffraction limited spot diameter is from about 1.9:1 to about 1:1.9.

To establish anticipation, each and every claim feature must be disclosed in a single cited art document. Claim 1 requires an imaging system where the projected pixel area and the diffraction limited spot size area in the object plane is about 0.0003 microns² or more and about 600 microns² or less, the ratio of the projected pixel area to the diffraction limited spot size area (in the object plane) is from about 5:1 to about 1:12. Harris et al fails to disclose, teach, or suggest a ratio of projected pixel area to the diffraction limited spot size area (in the object plane) from about 5:1 to about 1:12.

The Examiner notes portions of column 16, 1st full paragraph which states

For example, ~1 mm field-of-view could be imaged onto a 1000-element array at 1-μm pixelation. If the detection

elements are $20\ \mu\text{m}^2$, then the system magnification would be set to 20x. Note that this will not result in 1- μm resolution. **Pixelation is not equivalent to resolution.** If, for example, the inherent resolution limit of the objective lens is 0.5 μm and each 0.5 μm x 0.5 μm region in the object plane is mapped onto a pixel, the true resolution of the resulting digital image is not 0.5 μm . **To achieve true 0.5- μm resolution, the pixelation would need to correspond to a region $\sim 0.2\ \mu\text{m}$ x $0.2\ \mu\text{m}$ in the object plane.** In one preferred embodiment, the magnification of the imaging system is set to achieve the true resolution of the optics. (Emphasis added).

In other words, Harris et al teaches mapping a single diffraction limited spot (measured by diameter) onto 2.5 pixels (measured by width of square pixels). That is, 0.5 μm is mapped onto 2.5 pixels having a width of 0.2 μm . Harris et al clearly states such is required to achieve true resolution. Applying the measurements of Harris et al to square microns, the diffraction limited spot size area of Harris et al is $0.7854\ \mu\text{m}^2$ (πr^2 : 3.14159×0.25^2) and the pixel area is $0.04\ \mu\text{m}^2$ (0.2^2). Thus the ratio of the pixel area to the diffraction limited spot size area (in the object plane) is 0.051:1 or 1:19.6. The ratio of Harris et al is clearly outside the scope required by claim 1, which is from about 5:1 to about 1:12.

As noted by Harris et al, pixelation is NOT equivalent to resolution. The sentence of Harris et al "If, for example, the inherent resolution limit of the objective lens is 0.5 μm and each 0.5 μm x 0.5 μm region in the object plane is mapped onto a pixel, the true resolution of the resulting digital image is not 0.5 μm ." illustrates the point that pixelation is not equivalent to resolution. That is, this sentence SPECULATES at a possible pixel-resolution limit relationship, and it is taught that the speculative

relationship does not achieve true resolution. Moreover, this sentence is NOT meant to teach matching between pixels and diffraction limited spots. Harris et al fails to teach or suggest making an imaging system where the ratio of the projected pixel area to the diffraction limited spot size area (in the object plane) is from about 5:1 to about 1:12.

Since Harris et al does not disclose all of the features of claim 1, Harris et al cannot anticipate claims 1-4 and 6. Withdrawal of the rejection of claims 1-4 and 6 is therefore respectfully requested.

Claim 16 requires an imaging system where both the diffraction limited spot diameter in the object plane and the projected pixel width in the object plane are about 0.01 microns or more and about 20 microns or less, and the ratio of the projected pixel width to the diffraction limited spot diameter is from about 1:1.9 to about 1.9:1. Harris et al fails to disclose, teach, or suggest a ratio of projected pixel width to diffraction limited spot diameter in the object plane from about 1:1.9 to about 1.9:1.

As noted above, Harris et al teaches mapping a single diffraction limited spot (measured by diameter) onto 2.5 pixels (measured by width of square pixels). That is, 0.5 μm is mapped onto 2.5 pixels having a width of 0.2 μm . Applying the measurements of Harris et al to square microns, the diffraction limited spot size diameter of Harris et al is 0.5 μm and the pixel width is 0.2 μm . Thus the ratio of the pixel width to the diffraction limited spot size diameter (in the object plane) is 0.4:1 or 1:2.5. The ratio of Harris et al is clearly outside the scope required by claim 16, which is from about 1.9:1 to about 1:1.9.

Since Harris et al does not disclose all of the features of claim 16, Harris et al cannot anticipate claims 16-20. Withdrawal of the rejection of claims 16-20 is therefore respectfully requested.

The First Obviousness Rejection

Claim 5 has been rejected under 35 U.S.C. § 103(a) over Harris et al in view of Merrill. Merrill relates to a digital imager where each pixel has a triple well structure,

each well measuring a different primary color of light. In the Figure 6 noted by the Examiner, each of the three wells has a different size.

Claim 5 requires a sensor with a first subset of pixels having a first pixel area and a second a subset of pixels having a second pixel area, the first pixel area different from the second pixel area. Merrill fails to teach or suggest a sensor with a first subset of pixels having a first pixel area and a second a subset of pixels having a second pixel area, the first pixel area different from the second pixel area. While the individual wells within the pixels of Merrill appear to have a different size, all of the pixels have the same size. Claim 5 requires a sensor containing pixels of at least two different sizes. Therefore, one skilled in the art would not have been motivated by Merrill to provide a sensor with a first subset of pixels having a first pixel area and a second a subset of pixels having a second pixel area, the first pixel area different from the second pixel area.

Furthermore, Merrill fails to cure the fundamental deficiency of Harris et al. More specifically, Merrill fails to teach or suggest an imaging system with a ratio of projected pixel area to the diffraction limited spot size area (in the object plane) from about 5:1 to about 1:12. Withdrawal of the rejection is therefore respectfully requested.

The Second Obviousness Rejection

Claims 7 and 8 have been rejected under 35 U.S.C. § 103(a) over Harris et al in view of Connolly. Connolly relates to a photosensitive element. Connolly fails to cure the fundamental deficiency of Harris et al. More specifically, Connolly fails to teach or suggest an imaging system with a ratio of projected pixel area to the diffraction limited spot size area (in the object plane) from about 5:1 to about 1:12. Withdrawal of the rejection is therefore respectfully requested.

The Third Obviousness Rejection

Claims 9-13 and 15 have been rejected under 35 U.S.C. § 103(a) over Harris et al in view of Vock. Harris et al has been discussed above.

Claim 9 requires an imaging system where both the diffraction limited spot diameter in the object plane and the projected pixel pitch in the object plane are about 0.01 microns or more and about 20 microns or less, and the ratio of the projected pixel pitch to the diffraction limited spot diameter is from about 1:1.9 to about 1.9:1. Harris et al fails to disclose, teach, or suggest a ratio of projected pixel pitch to diffraction limited spot diameter in the object plane from about 1:1.9 to about 1.9:1.

As noted above, Harris et al teaches mapping a single diffraction limited spot (measured by diameter) onto 2.5 pixels (measured by width of square pixels). That is, 0.5 μm is mapped onto 2.5 pixels having a width of 0.2 μm . Applying the measurements of Harris et al to square microns, and assuming for sake of argument only that the pixel pitch of Harris et al is 0.2 μm , the diffraction limited spot size diameter of Harris et al is 0.5 μm . Thus the ratio of the pixel pitch to the diffraction limited spot size diameter (in the object plane) is 0.4:1 or 1:2.5. The ratio of Harris et al is clearly outside the scope required by claim 9, which is from about 1.9:1 to about 1:1.9. Vock also fails to teach or suggest a ratio of projected pixel pitch to diffraction limited spot diameter in the object plane from about 1:1.9 to about 1.9:1. Since Harris et al and Vock do not teach or suggest all of the features of claim 9, one skilled in the art would not have been motivated by Harris et al and Vock to make the imaging system of the claimed invention. Therefore, Harris et al and Vock cannot render claim 9-13 and 15 obvious. Withdrawal of the rejection of claims 9-13 and 15 is respectfully requested.

Moreover, Vock relates to a golf ball driving distance tracking device. Figure 6A of Vock noted by the Examiner is alleged to show pixels adjacent one another. However, Figure 6A is "a representative solid state detector array" (column 12, line 59) showing pixels 144 as a grid, and one skilled in the art would understand that grid pixel

elements 144 in Figure 6A is NOT an actual drawing of a detector. It is a representation of a detector to facilitate discussion. For this additional reason, withdrawal of the rejection of claims 9-13 and 15 is respectfully requested.

The Fourth Obviousness Rejection

Claim 14 has been rejected under 35 U.S.C. § 103(a) over Harris et al in view of Vock and further in view of Connolly. As noted above in connection with the discussion of claims 7 and 8, Connolly fails to cure the fundamental deficiency of Harris et al. Therefore, withdrawal of the rejection of claim 14 is respectfully requested.

Petition for Extension of Time

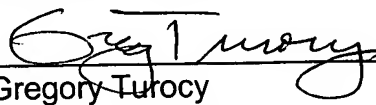
A request for a one month extension of time is hereby made (small entity status has been established). A Credit Card charge form is enclosed herewith to pay the petition fees.

Should the Examiner believe that a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 50-1063.

Respectfully submitted,

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